

IN THE CLAIMS:

Please cancel claims 1-15 without prejudice. Applicant hereby submits new claims 16 - 45. These claims are submitted to overcome the EXAMINER's rejections.

CLAIMS:

Claims 1-15 (canceled)

16. (new) A method for providing comprehensive fire prevention and suppression in an aircraft having an engine, a fuel tank containing fuel and a human occupied compartment, by producing oxygen-depleted air from a bleed air received from said engine, said method comprising:

separating said bleed air into an oxygen-enriched gas mixture and an oxygen-depleted gas mixture;

removing said oxygen-enriched gas mixture by discharging it outside the aircraft;

supplying said oxygen-depleted gas mixture into said fuel tanks for establishing therein a fuel ignition suppression environment in order to prevent ignition of said fuel in said fuel tanks; maintaining the oxygen content in said fuel ignition suppression environment in the range from approximately 9% to approximately 16% of oxygen;

monitoring at least one of said fuel tanks and said human occupied compartment for the presence of at least one of smoke and fire;

generating a signal when said at least one of smoke and fire is detected;

monitoring the oxygen content of the atmosphere in at least one of said fuel tank and said human occupied compartment; and

adjusting the oxygen content of said oxygen-depleted gas mixture in response to said signal.

17. (new) The method of claim 16, wherein the aircraft further comprises a cargo compartment, and the method further comprises the step of:

supplying said oxygen depleted gas mixture into said cargo compartment;

establishing a hypoxic environment in said cargo compartment, wherein said hypoxic environment in said cargo compartment contains oxygen in the range of approximately 9% to approximately 16% by volume; and

maintaining said hypoxic environment in said cargo compartment.

18. (new) The method of claim 16, wherein in case of an emergency, supplying said oxygen enriched gas mixture, via respiratory masks, to passengers and crew in said aircraft;
automatically deploying this supply when a signal from smoke and fire detection system received or a depressurization of the cabin being detected.
19. (new) The method of claim 17, wherein said cargo compartment is constantly ventilated with said oxygen depleted gas mixture having oxygen content from 12% to 16%.
20. (new) The method according to claim 16, wherein
when needed, the mixing of said oxygen-depleted gas mixture with said bleed air is provided in order to increase and regulate the oxygen content in the cabin and different compartments of the aircraft;
hypoxic gas mixture from said mixing device is supplied in amount equal or larger than amount of air leaking from the protected compartment allowing to maintain a desired oxygen content by ventilating the compartment with said hypoxic mixture.
- 21 (new) The method according to claim 16, wherein
said oxygen-depleted gas mixture is supplied directly into protected compartment allowing to achieve and maintain the desired oxygen content by diluting said compartment's atmosphere with the oxygen-depleted gas mixture.
22. (new) The method according to claim 17, wherein
said oxygen-depleted gas mixture is used to propel water through a special nozzle for generating water mist inside the protected compartment in order to suppress a fire.
23. (new) The method according to claim 17, wherein
said oxygen-depleted gas mixture is used to propel a foam generating solution through a foam producing device for generating hypoxic fire-extinguishing foam inside a protected compartment.
24. (new) The method according to claim 16, wherein

a plurality of oxygen-separation membranes is used for separating said bleed air by connecting them in parallel in a single unit, so a failure of one membrane does not affect significantly the performance of the whole device.

25. (new) The method according to claim 16, wherein a plurality of pressure-swing adsorption units is used for separating said bleed air by connecting them in parallel in one module, so a failure of one unit does not affect significantly the performance of the whole device.

26. (new) The method according to claim 16, wherein providing of a pressurized container having sufficient amount of said hypoxic air in order to flood or accelerate the flooding of the passenger cabin and establishing there a breathable fire-extinguishing atmosphere in a case of a fire.

27. (new) The method according to claim 16, wherein a cryogenic method is used for producing nitrogen and oxygen from atmospheric air and said oxygen-depleted gas mixture being made by mixing nitrogen with the bleed air.

28. (new) A system for providing comprehensive fire prevention and suppression in an aircraft, said aircraft having an engine, a fuel tank and at least one human occupied compartment, by producing oxygen-depleted or hypoxic air from a bleed air, said system comprising:

an air-separation device receiving said bleed air from said aircraft engine and separating said bleed air into first and second gas mixtures; said first mixture being oxygen-enriched air and said second gas mixture being oxygen-depleted air;

a venting means for releasing said first gas mixture outside the aircraft and means for supplying said first gas mixture, in case of an emergency, to passengers and the aircraft crew;

means for supplying said second gas mixture into said fuel tanks and said at least one compartment for ventilation and maintaining there a constant hypoxic fire-preventive environment in order to prevent ignition that can lead to explosion or fire; the oxygen content in said fire-preventive environment is maintained below 16%;

a smoke and fire detection system with sensors installed in at least one compartment in the aircraft;

an oxygen content monitoring system providing oxygen content data in said at least one compartment;

a computerized control panel for receiving and analyzing data from the smoke and fire detection and oxygen monitoring systems and regulating the oxygen content in the protected compartments.

29. (new) The system according to claim 28, wherein

a pressurized container is provided containing an amount of said hypoxic air sufficient to flood or to accelerate the flooding of the passenger cabin and the formation there a breathable fire-extinguishing atmosphere in a case of a fire;

30. (new) The system according to claim 28 and

a mixing device for providing, when needed, the mixing of said oxygen-depleted gas mixture with said bleed air in order to increase and regulate the oxygen content in the cabin and different compartments of the aircraft;

31. (new) The system according to claim 28 and

means for supplying said second gas mixture directly into protected compartment in order to achieve and maintain the designed oxygen content by ventilating the compartment with the oxygen-depleted gas mixture.

32. (new) The system according to claim 28 and

said second gas mixture having oxygen content greater than 9%.

33. (new) The system according to claim 28, wherein

means for propelling water by said second gas mixture through a special nozzle for generating water mist inside the protected compartment.

34. (new) The system according to claim 28 and

a foam producing device for generating hypoxic foam inside the protected compartment by propelling foam generating solution with said second gas mixture.

35. (new) The system according to claim 28, wherein said air-separation device includes a plurality of oxygen-separation membranes connected in parallel in a single unit, so a failure of one membrane does not affect significantly the performance of the whole device.

36. (new) The system according to claim 28, wherein said air-separation device includes a plurality of pressure-swing adsorption modules connected in parallel in a single unit, so a failure of one such module does not affect significantly the performance of the whole device.

37. (new) The system according to claim 28, wherein said air-separation device is a cryogenic unit producing nitrogen and oxygen from air and said second gas mixture is made by mixing nitrogen with the bleed air.

38. (new) A method for extinguishing fires using water mist propelled by hypoxic air, said method comprising:
producing hypoxic air in an air-separation device and providing it under pressure for propulsion of water through a water mist generating nozzle;
supplying the system with water for propelling it by said hypoxic air;
producing water mist in a water mist generating nozzle by propelling water with hypoxic air;
when deployed, said system generates and releases water mist inside a protected area, said water mist propelled by said hypoxic air that simultaneously gradually dilutes the internal atmosphere and decreases its oxygen content to the fire extinguishing level;
the oxygen content in said hypoxic air propelling water mist being below 16%;
producing water mist for the period of time needed to establish said fire-extinguishing level;
said method designated for extinguishing fires in aircraft, marine vessels, buildings, all type of vehicles and other enclosed and semi-enclosed structures.

39. (new) A system for extinguishing fires using water mist propelled by hypoxic air, said system comprising:
an air-separation device providing hypoxic air under pressure for propulsion of water through a water mist generating nozzle;
a water tank for supplying the system with water propelled by said hypoxic air;
a water mist generating nozzle producing water mist propelled by hypoxic air;
when deployed, said system generates and releases water mist inside a protected area, said water mist propelled by said hypoxic air that simultaneously gradually dilutes the internal atmosphere and decreases its oxygen content to the fire extinguishing level;
the oxygen content in said hypoxic air propelling water mist being below 16%;
the amount of water in said water tank being calculated to be sufficient to produce water mist for the period of time needed to establish said fire-extinguishing level;
said system designated for extinguishing fires in aircraft, marine vessels, buildings, all type of vehicles and other enclosed and semi-enclosed structures.
40. (new) A method of extinguishing fires in aircraft, marine vessels and other vehicles, buildings and tunnels, said method comprising:
a dilution of the atmosphere in the protected space with hypoxic air having oxygen content below 16% until a fire-extinguishing atmosphere is created;
a maintaining said fire-extinguishing atmosphere at a designed oxygen content level for as long as needed by ventilating said protected space with the hypoxic air with oxygen content ranging from 12% to 16%.
41. (new) A fire-extinguishing composition, said composition comprising:
a mixture of water mist and hypoxic air having oxygen content below 16%; said mixture being generated by propulsion of water through a special mist generating nozzle using hypoxic air;
said mixture, propelled with said hypoxic air, being released into protected area, which allows to rapidly control and extinguish a fire.
42. (new) A fire-suppression composition, said composition comprising:

a mixture of foam and hypoxic air having oxygen content below 16%; said mixture being generated by propulsion of a foam generating solution through a special foam generating device that produces said foam using hypoxic air;

said foam, propelled further with said hypoxic air, being released into protected area, which allows to rapidly control and extinguish a fire.

43. (new) The system and method according to claim 41, wherein the oxygen content in said composition is maintained in the range from 1-15%.

44. (new) The system and method according to claim 42, wherein the oxygen content in said composition is maintained in the range from 1-15%.

45. (new) The system and method according to claim 42, wherein said foam is made from a standard fire-extinguishing foam solution that is normally used for propelling with ambient air or nitrogen.